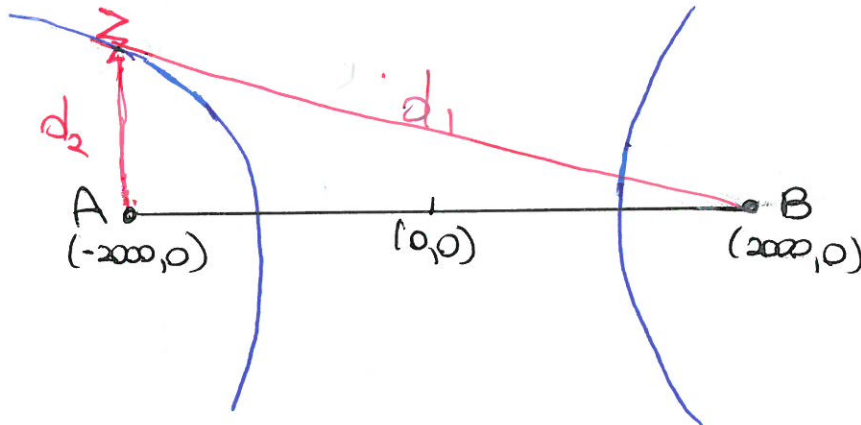


Name _____
Date _____

Trigonometry
Hyperbola Review

13. Two amateur meteorologist A and B, living 4000m apart (4000m), see a storm approaching. When the storm is due north of A, there is a clap of thunder. B hears it 9 sec after A. Assuming the speed of sound is $\frac{340\text{m}}{\text{sec}}$, determine an equation that models possible locations for the storm at that time. What is the position of the storm?



$$d_1 - d_2 = 2a$$

$$4 \text{ sec} (340 \text{ m/sec}) = 2a$$

$$1360 = 2a$$

$$680 = a$$

$$c = 2000$$

$$c^2 = a^2 + b^2$$

$$(2000)^2 - (680)^2 = b^2$$

$$1,659,100 = b^2$$

$$\frac{x^2}{(1530)^2} - \frac{y^2}{b^2} = 1$$

Equation

$$\frac{x^2}{1530^2} - \frac{y^2}{1,659,100} = 1$$

When the storm is due North, we are at $x = -2000$

$$\frac{(-2000)^2}{(1530)^2} - \frac{y^2}{1,659,100} = 1$$

$$\frac{-y^2}{1,659,100} = 1 - \frac{(2000)^2}{(1530)^2}$$

$$y^2 = 1,175,878$$

$$y = 1084.38 \text{ m}$$

The storm is 1084.38m
~~above~~ North of A

Name _____
Date _____

Trigonometry
Hyperbola Review

Find the equation for the specified hyperbola in standard form.

5. Vertices at $(0, \pm 2)$
Foci at $(0, \pm 4)$

$C(0,0)$

$$\boxed{\frac{y^2}{4} - \frac{x^2}{12} = 1}$$

$c=4$
 $c^2 = a^2 + b^2$
 $16 = 4 + a^2$
 $a^2 = 12$

6. Vertices at $(0, \pm 3)$
Asymptotes at $y = \pm 3x$

$C(0,0)$

$$\boxed{\frac{y^2}{9} - \frac{x^2}{1} = 1}$$

$\frac{b}{a} = \frac{3}{1}$
 $a = 1$

7. Vertices at $(2,0)$ and $(6,0)$
 $C = (4,0)$

Foci at $(0,0)$ and $(8,0)$

$$\boxed{\frac{(x-4)^2}{4} - \frac{(y)^2}{12} = 1}$$

$a=2$
 $c=4$
 $16 = 4 + b^2$
 $b^2 = 12$

9. $\frac{2x^2}{6} - \frac{3y^2}{6} = \frac{6}{6}$

$$\boxed{\frac{x^2}{3} - \frac{y^2}{2} = 1}$$

8. Vertices at $(0,2)$ and $(6,2)$

$C = (3,2)$ $y = \frac{2}{3}x$

Asymptotes at

$\frac{b}{a} = \frac{2}{3}$ $y = -\frac{2}{3}x + 4$

$a=3$

$b=2$

$$\boxed{\frac{(x-3)^2}{9} - \frac{(y-2)^2}{4} = 1}$$

10. $\frac{4(x-1)^2}{36} - \frac{9(y+2)^2}{36} = \frac{36}{36}$

$$\boxed{\frac{(x-1)^2}{9} - \frac{(y+2)^2}{4} = 1}$$

11. $9x^2 - y^2 - 36x - 6y + 18 = 0$

$9x^2 - 36x - y^2 - 6y = -18$

$9(x^2 - 4x + 4) - (y^2 + 6y + 9) = -18 + 36 - 9$

$9(x-2)^2 - (y+3)^2 = 9$

$$\boxed{\frac{(x-2)^2}{1} - \frac{(y+3)^2}{9} = 1}$$

12. $16y^2 - x^2 + 2x + 64y + 63 = 0$

$16y^2 + 64y - x^2 + 2x = -63$

$16(y^2 + 4y + 4) - (x^2 - 2x + 1) = -63 + 64 - 1$

$16(y+2)^2 - (x-1)^2 = 0$

No Ellipse!!

Name _____
Date _____

Trigonometry
Hyperbola Review

$$3. \frac{(y-3)^2}{8} - \frac{(x-2)^2}{4} = 1$$

center (2, 3)

transverse axis y

vertices (2, 3 + \sqrt{8}) and (2, 3 - \sqrt{8})

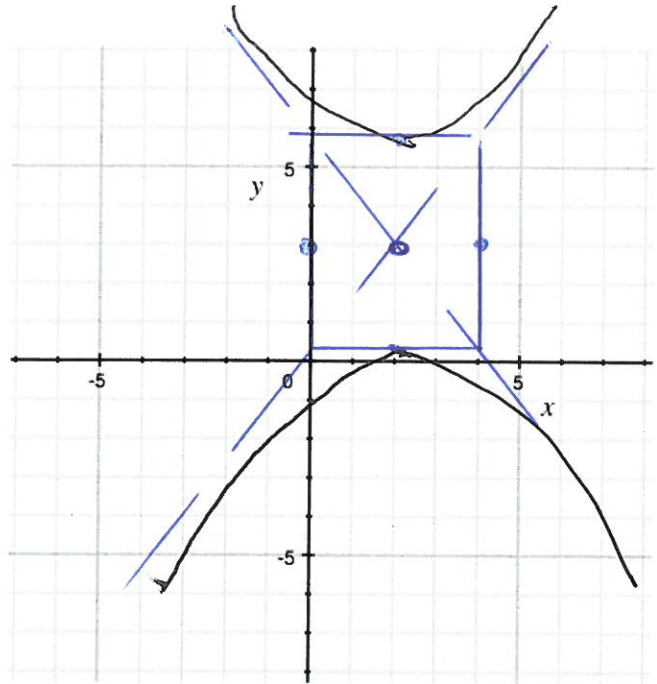
foci (2, 3 + \sqrt{12}) and (2, 3 - \sqrt{12})

asymptotes $y - 3 = \frac{\sqrt{2}}{2}(x - 2)$ and $y - 3 = -\frac{\sqrt{2}}{2}(x - 2)$

$$c = \sqrt{8 + 4} = \sqrt{12}$$

$$(y - 3) = \pm \sqrt{\frac{4}{8}}(x - 2)$$

$$y - 3 = \pm \frac{\sqrt{2}}{2}(x - 2)$$



$$4. \frac{9(x+4)^2}{36} - \frac{4y^2}{36} = \frac{36}{36}$$

center (-4, 0)

transverse axis x

vertices (-6, 0) and (-2, 0)

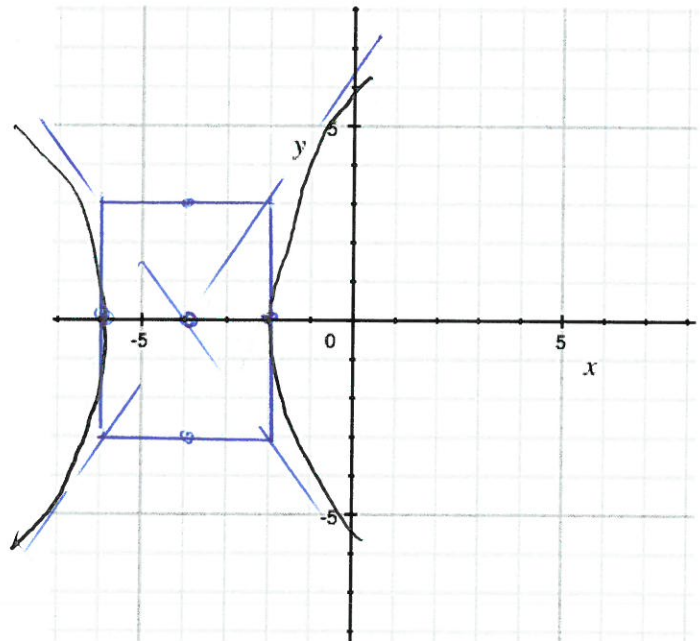
foci (-4 + \sqrt{13}, 0) and (-4 - \sqrt{13}, 0)

asymptotes $y = \frac{3}{2}(x + 4)$ and $y = -\frac{3}{2}(x + 4)$

$$\frac{(x+4)^2}{4} - \frac{y^2}{9} = 1$$

$$c = \sqrt{4 + 9} = \sqrt{13}$$

$$y = \pm \frac{3}{2}(x + 4)$$



Name _____
Date _____

Trigonometry
Hyperbola Review

For each hyperbola, identify the center, transverse axis, vertices, foci and asymptotes. Then graph.

1. $\frac{x^2}{4} - \frac{y^2}{16} = 1$

center (0,0)

transverse axis x

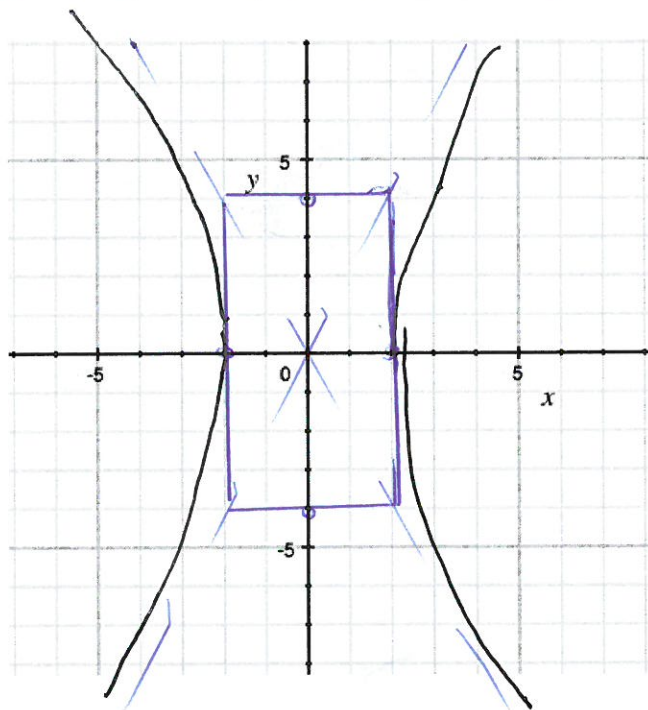
vertices (2,0) and (-2,0)

foci ($\sqrt{20}$, 0) and ($-\sqrt{20}$, 0)

asymptotes $y = 2x$ and $y = -2x$

$c = \sqrt{16+4} = \sqrt{20}$

$y = \pm \frac{4}{2}x$



2. $(y+1)^2 - \frac{x^2}{25} = 1$

center (0,-1)

transverse axis y

vertices (0,0) and (0,-2)

foci (0, -1 + $\sqrt{26}$) and (0, -1 - $\sqrt{26}$)

asymptotes $(y+1) = \frac{1}{5}x$ and $(y+1) = -\frac{1}{5}x$

$c = \sqrt{25+1} = \sqrt{26}$

$y+1 = \pm \frac{1}{5}(x)$

